MARICOPA COUNTY DEPARTMENT OF PUBLIC HEALTH

Quarterly Epidemiologic Report

2006

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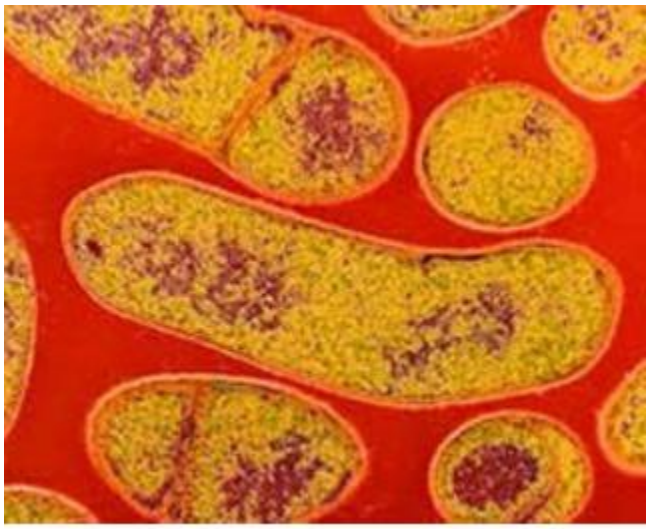
Disease of the Quarter: Infant Botulism

Introduction Infant botulism is a rare, serious, yet naturally occurring illness caused by *Clostridium botulinum. C. botulinum* is a spore-forming, anaerobic bacteria found ubiquitously in soil. These bacteria produce botulinum toxins, types A-G; in cases of infant botulism, types A and B are typically implicated (1). Botulinum toxins are the most potent toxins known, with an extremely small amount of toxin required for lethality in humans (2). Botulinum toxins are neurotoxigenic, and act by blocking neurotransmission and preventing release of the neurotransmitter acetylcholine, resulting in progressive flaccid paralysis (2, 3, 4). Illness in infants occurs after the ingestion of Clostridium spores, which germinate, multiply, and eventually produce their deadly toxin, which is subsequently absorbed through a mucosal surface. Infants are at higher risk for botulism toxicity because normal intestinal flora has not yet been established. This allows the bacteria to grow, uninhibited by competing flora (2).



Clostridium botulinum

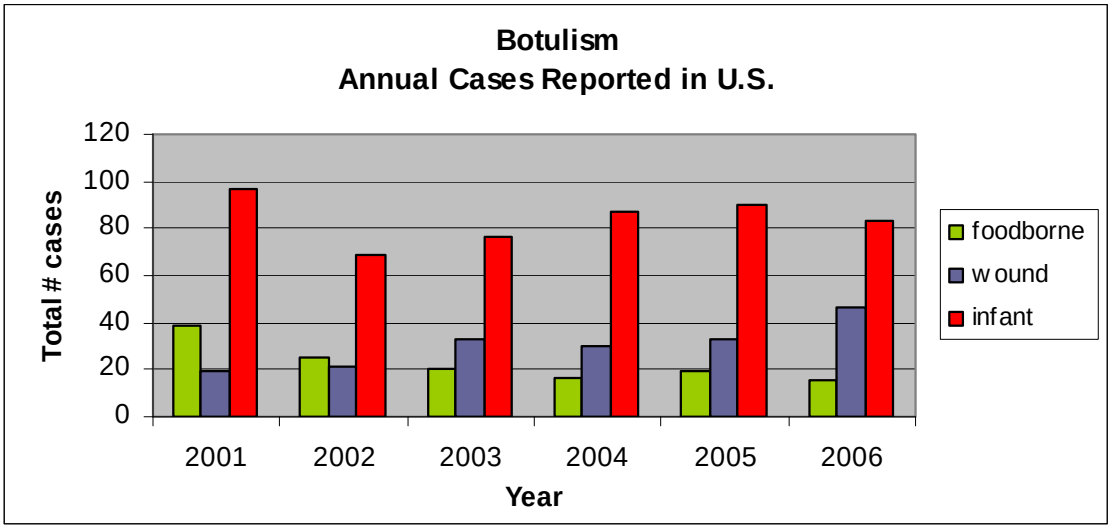
Epidemiology Of the three main forms of human botulism infections (food borne, infant, and wound), infant cases account for about 70% of the approximately 110 cases seen annually in the United States. Graph 1 shows the yearly number of cases of all types of botulism reported in the United States. This translates to an average of 80 cases of infant botulism each year. The mean age of onset is 13 weeks with a range from 1 to 63 weeks (3). Ninety percent of all cases are less than six months old (1).

According to the CDC, in 2005, 23 states reported cases of infant botulism. A total of 85 cases were reported nationwide. California had the most cases with 41 reported. Pennsylvania, New Jersey, and Maryland each reported five or more cases (8,7,5 respectively), while New Hampshire, Illinois, Missouri, Delaware, Virginia, Florida, Kentucky, Alabama, Louisiana, Oklahoma, Texas, Idaho, Colorado, New Mexico, Utah, Washington, and Oregon reported at

least one case. All other states reported no cases. In 2005, Arizona reported one case (5). These numbers are consistent with previous years.

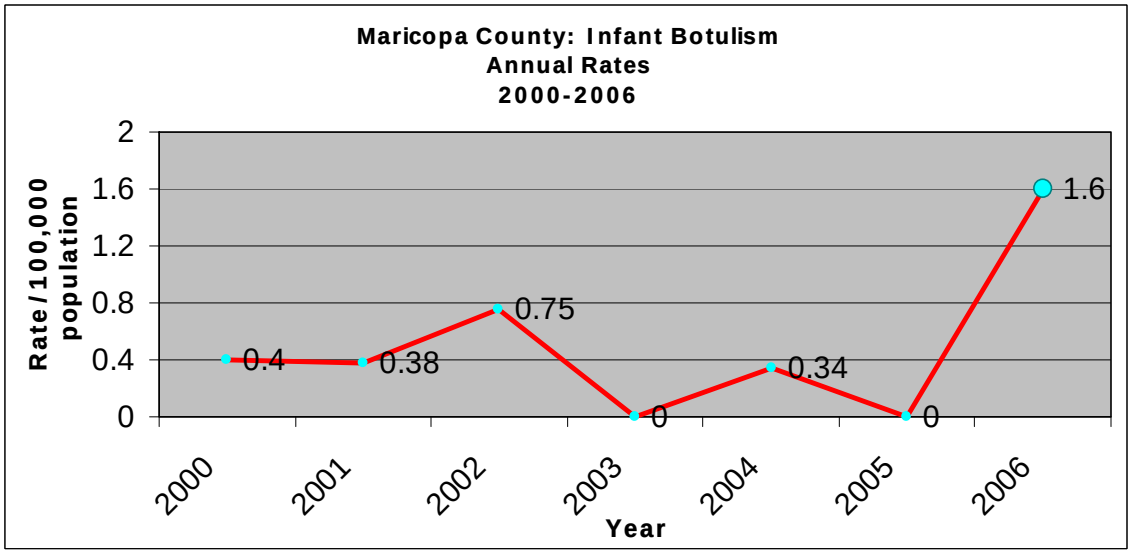
From January to December of 2006, Maricopa County has investigated five cases of infant botulism. One of these cases is out of jurisdiction, although exposure likely occurred in Maricopa County, and so it is included in the calculation of the annual rate. This is an unusually high incidence as compared to the typical number of cases reported yearly since 2000 (one to two cases per year). Graph 2 shows the yearly rate of infant botulism cases in Maricopa County.

Graph 1.



* MMWR 2007 Jan 5; 55(52): 1396-1407

Graph 2.



*The 2006 rate was determined using county growth rate estimates applied to the 2000 U.S Census population. (2000 U.S. Census population for Maricopa County, U.S. Census Bureau)

Symptoms & Treatment

The common prodrome of infant botulism is constipation, which may precede the onset of other signs of illness by several weeks. While illness typically begins with constipation, this sign may be absent altogether or overlooked (1). Signs typically seen in the progression of illness include: weak suck and cry, poor feeding, ptosis with abnormal eye movements; generalized weakness or hypotonia beginning with neck muscles and descending down the body (floppy baby); and respiratory compromise (2). Fatigable pupilllary reaction is a sign specific to infant botulism and should always be tested in suspect cases. Signs and symptoms of botulism are commonly confused with sepsis or meningoencephalitis. The time course of illness may be less than twenty-four hours to more than one week from the first signs and symptoms to the peak of illness (6).

Diagnosis of infant botulism should be based on case history and physical findings. Routine blood chemistries and urinalysis are typically normal in botulism cases and abnormal results help differentiate botulism from other diseases. Stool culture and toxin testing of stool and sera may aid in the diagnosis, but results of these tests may take considerable time and delay treatment. It is recommended these tests be used for confirmation of diagnosis, as treatment with antitoxin should be administered as early in the disease progression as possible (3).

Recently, a new and highly effective human-derived antitoxin for infant botulism has been produced, BabyBIG (botulism immunoglobulin). Formerly, botulinum antitoxin of equine origin was used and lead to twenty percent of cases suffering from side effects such as anaphylaxis (1, 2, 7). Treatment should be administered early in the course of disease to prevent continued binding of toxin to nerve terminals; however, even without the administration or with delayed administration of antitoxin, infant botulism is a self-limiting illness (2). With appropriate supportive therapy, the case mortality rate is less than two percent (1).

Risk & Exposure

Although there is no corroborating evidence, it is thought that breast-fed infants are at higher risk for infant botulism than infants who receive non-human foods. Breast-fed infants maintain simple gut flora, which provides an ideal environment for *C. botulinum* colonization (2,8). It is well known that honey is a risk factor for botulism, and it is globally advised that infants under the age of one year not be fed honey (3). While honey consumption is a familiar risk, it accounts for only about twenty percent of all cases (2). A lesser known risk is exposure to soil. Dusty conditions from nearby construction, street

repair, traffic from highways, or farming have been identified as possible sources of Clostridia infections (8). Household dust and vacuum cleaner dust may also be sources of infection (9).

Infant Botulism in Maricopa County

Each of the five cases reported in 2006 in Maricopa County, including the out-of-jurisdiction case, presented with classic signs and symptoms of infant botulism. Poor feeding, weak suck, and breast feeding as primary nutritive source were common. None had ingested honey and three had known dust exposure. Other symptoms included: hypotonia, ptosis, CO2 retention, absent reflexes, facial dysphagia, floppiness, and respiratory failure. All cases in Maricopa County were treated with BabyBig and survived their illness. The source of infection remains unknown in each case.

The increase of cases seen in 2006 may be attributable to infant's increased exposure to environmental sources of *C. botulinum,* such as dusty or windy conditions or indoor dirt or dust. In the past, many cases of infant botulism may have been misdiagnosed due to unusual presentation or the unfamiliarity of the disease by the treating physician (2, 6). The 2006 increase in cases may be an indication of awareness and knowledge of botulism in the medical community, thus increasing the numbers of accurately diagnosed cases. The increase may also be a consequence of the enormous amount of housing development in our desert environment, increased construction, and increased traffic, all of which disturb soil and expose individuals to the hazard of particulate matter that may contain *C. botulinum.*

Recommendations

Knowing the risks, signs and symptoms of infant botulism is important not only for healthcare workers and medical professionals, but also for parents of children under one year of age. While infant botulism is a rare infection, it does have serious consequences.

- Parents should be advised of the risk of feeding honey or syrups to infants, and should be informed about the early signs of botulism toxicity.
- Medical professionals should include infant botulism in the differential diagnosis of cases of suspected sepsis or meningoencephalitis especially in primarily breast-fed infants and when cranial nerve palsies are present.
- Physicians should report suspected cases of botulism to county or state health departments. For suspected infant botulism occurring in any state, the California

Department of Health Services, Infant Botulism Treatment and Prevention Program should be contacted (at 510-540-2646).

Maricopa County Department of Public Health investigates all cases of suspect botulism. The Department of Public Health works to educate the community and healthcare professionals using the most recent information available.

For more information on infant botulism, please visit the following sites:

- **Arizona Department of Health Services, Frequently Asked Questions about Botulism at http://azdhs.gov/phs/edc/edrp/es/botulismf.htm**
- **Centers for Disease Control and Prevention at http://www.cdc.gov/index.htm**
- **Morbidity and Mortality Weekly Report at http://www.cdc.gov/mmwr/**
- **California Department of Health Services at http://www.dhs.ca.gov/ And the Infant Botulism Treatment and Prevention Program at http://www.dhs.ca.gov/ps/dcdc/infantbot/ibtindex.htm**

Citations

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8. Long SS, Gajewski JL, Brown LW, Gilligan PH. Clinical, Laboratory, and Environmental Features of Infant Botulism in Southeastern Pennsylvania. Pediatrics. May 1985; 75(5): 935-941.
9. Nevas M, Lindstrom M, Virtanen A, Hielm S, Kuusi M, Arnon SS, Vuori E, Korkeala H. Infant Botulism Acquired from Household Dust Presenting as Sudden Infant Death Syndrome. Journal of Clinical Microbiology. Jan 2005; 43(1): 511–513.

SURVEILLANCE

During the 06-07influenza season, MCDPH will be working with local hospitals, urgent care centers, and health care centers to monitor weekly levels of influenza-like illness. Additionally, MCDPH will be collecting weekly absenteeism information from local participating schools. This data is summarized in the weekly reports along with lab-confirmed case counts and pneumonia and influenza mortality statistics. Beginning in mid-November, weekly summary reports are posted on the MCDPH web site:

(http://www.maricopa.gov/Public_Health/Resources/EPI/flu.aspx)

MCDPH greatly appreciates the efforts of our community surveillance partners. If you are interested in participating in the seasonal Influenza Surveillance Program, or if you have questions regarding reporting, please call or email Natalie Fuller: (602) 372-2613 nataliefuller@mail.maricopa.gov.

***MCDPH Influenza Surveillance:**

http://www.maricopa.gov/Public_Health/Resources/EPI/flu.aspx

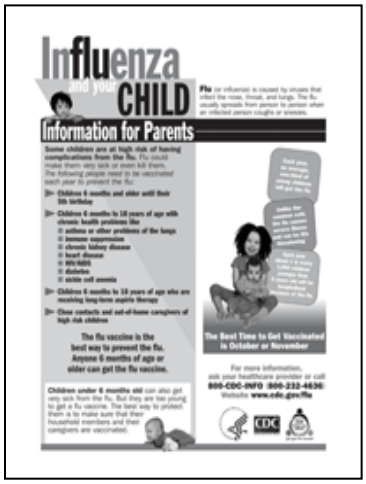
***ADHS Influenza Surveillance:**

http://www.azdhs.gov/phs/oids/epi/flu/index.htm

***US Influenza Surveillance:**

http://www.cdc.gov/flu/weekly/fluactivity.htm

VACCINATION



For information on local vaccination clinics, visit: http://www.cir.org/seasonal-flu.html or contact your health care provider or health care plan.

***CDC Vaccine Information:**

http://www.cdc.gov/flu/protect/keyfacts.htm

http://www.cdc.gov/flu/professionals/vaccination/

INFECTION CONTROL

***CDC Infection Control Information:**

http://www.cdc.gov/flu/professionals/infectioncontrol/

***ADHS Influenza Prevention Toolkit**

http://www.azdhs.gov/flu/flu_toolkit.htm

***CDC Influenza Prevention Materials**

http://www.cdc.gov/flu/professionals/patiented.htm

VACCINATION AND HEALTH-CARE WORKERS

Excerpts from Prevention and Control of Influenza: Recommendations of the Advisory Committee on Immunization Practices (ACIP) (MMWR 2006 Jul 28; 55 (RR10): 1-42) (http://www.cdc.gov/flu/professionals/vaccination/hcw.htm):

- **All health-care workers should be vaccinated against influenza annually.**
- **An improvement in vaccination coverage levels might help to protect health-care workers, their patients, and communities; improve prevention of influenza-associated disease and patient safety; and reduce disease burden.**
- **Physicians, nurses and other workers in both hospital and outpatient-care settings, including medical emergency-response workers (e.g., paramedics and emergency medical technicians), should be vaccinated, as should employees of nursing home and chronic-care facilities who have contact with patients or residents.**
- **For additional information, please see: Influenza Immunization Among Health Care Workers, a National Foundation for Infectious Diseases document which includes summary information on (1) approaches to improving vaccination rates among health care workers, (2) influenza outbreaks in health care settings, and (3) economic benefits of influenza immunization (http://www.nfid.org/publications).**

WHO SHOULD GET VACCINATED*?

In general, anyone who wants to reduce their chances of getting the flu can get vaccinated.

However, it is recommended by ACIP that certain people should get vaccinated each year. They are either people who are at high risk of having serious flu complications or people who live with or care for those at high risk for serious complications.

People who should get vaccinated each year are:

1. **People at high risk for complications from the flu, including:**
   - Children aged 6 months until their 5th birthday,
   - Pregnant women,
   - People 50 years of age and older, and
   - People of any age with certain chronic medical conditions;
   - People who live in nursing homes and other long term care facilities.

2. **People who live with or care for those at high risk for complications from flu, including:**
   - Household contacts of persons at high risk for complications from the flu (see above)
   - Household contacts and out of home caregivers of children less than 6 months of age (these children are too young to be vaccinated)
   - Healthcare workers.

*Excerpts from the CDC's "Key Facts about Influenza (Flu) Vaccine" page, (**http://www.cdc.gov/flu/protect/keyfacts.htm**).

American Public Health Association 134th Annual Meeting & Exposition

What: Public Health and Human Rights Meeting and Exposition
When: November 4-8, 2006
Where: The New Boston Convention and Exposition Center in Boston, MA
Website: http://www.apha.org/meetings/

This year's national APHA conference participants include epidemiologists from MCDPH, Mare Schumacher, Jeanette Gibbon, Alana Shacter and Jennifer Stewart.

Presentations by MCDPH staff:

1. *To reply or not to reply; the fundamental problem with email questionnaires*- Jennifer Stewart.

2. *Human trafficking and mass casualty motor collisions in the Desert Southwest*– Alana Shacter.

3. *Live on Channel 10 news tonight: Effect of media attention on outbreak investigations*- Jeanette Gibbon.

Don't forget animal bites need to be reported! A bite from *any* animal, whether it is vaccinated, stray, or wild is required by law to be reported.

* Arizona Revised Statutes- Title 11, Article 6, 11-1014 section D.

West Nile Virus (WNV) Update

West Nile Virus (WNV) surveillance is ongoing for the 2006 mosquito season. This includes positive mosquito pools, equines or human cases. The table below shows the current case counts (as of Dec 31, 2006) for WNV in Maricopa County.

As of Dec 31, 2006, Maricopa County has had 75 human cases of WNV, including six deaths. For the latest information on WNV visit the MCDPH website: http://www.maricopa.gov/wnv/ or call the WNV Hotline at 602-506-0700.

West Nile Virus Cases by Gender and Disease Classification Maricopa County, 4-1-2006 through 12-31-2006

Case Classification	# Male	# Female	Total # Cases	%	# Deaths
Encephalitis	18	3	21	28.00%	6
Meningitis	9	6	15	20.00%	
Viremic Donor: Encephalitis	0	0	0	0.00%	
Viremic Donor: Meningitis	0	0	0	0.00%	
Paralysis Syndrome	4	0	4	5.33%	
Neuroinvasive Disease, Cumulative	31	9	40	53.33%	6
Fever	10	17	27	36.00%	
Viremic Donor: Fever	6	1	7	9.33%	
Fever, Cumulative	16	18	34	45.33%	
Unknown	1	0	1	1.33%	
Total Cumulative	**48**	**27**	**75**	**100.00%**	**6**
Viremic Donor: Asymptomatic*			2		
Viremic Donor: Unclassified **			3		

*Viremic donor - Asymptomatic cases are not included in the confirmed case counts. Although they are not part of the case counts, these data are important in the overall West Nile virus surveillance program.

**One donor positive was grouped with Viremic Donor Unclassified, WNV detected in serum Via NAT (Nucleic Acid Test).

West Nile Virus (WNV) Update

West Nile Virus Cases by Age Maricopa County, 4-1-2006 through 12-31-2006.						
AGE	Neuro-invasive	%	Fever*	%	Unknown	Total %
0-17	0	0.0%	1	1.3%	0	1.33
18-29	2	2.7%	2	2.7%	1	6.67
30-39	2	2.7%	2	2.7%	0	5.33
40-49	7	9.3%	13	17.3%	0	26.67
50-59	9	12.0%	7	9.3%	0	21.33
60-69	6	8.0%	6	8.0%	0	16.00
70-79	11	14.7%	3	4.0%	0	18.67
80-89	3	4.0%	0	0.0%	0	4.00
90-99	0	0.0%	0	0.0%	0	0.00
TOTAL	40	53.3%	34	45.3%	1	100.00

*includes VD fever

West Nile Virus

For more information:

Maricopa County Department of Public Health websites:
Mosquito reduction and avoidance, dead bird reporting:
http://www.maricopa.gov/envsvc/water/vector/westnile.asp

Maricopa County website on WNV: http://www.maricopa.gov/wnv/

Fight the Bite flyer:
http://www.maricopa.gov/public_health/wnv/docs/WNV-FightTheBite.pdf

Arizona Department of Health Services website on WNV: www.westnileaz.com
ADHS toll-free number: 1-800-314-9243 provides information about WNV.

CDC: http://www.cdc.gov/ncidod/dvbid/westnile/index.htm

México: http://www.cenave.gob.mx/von/default.asp

For a complete list of reporting requirements for communicable diseases:
http://www.maricopa.gov/Public_Health/ControlPrevention/Communicable/default.aspx

Maricopa County Communicable Disease Summary
Confirmed and probable cases reported in 2006 (1/1/06 – 12/31/06)

DIAGNOSIS	QUARTER 1	2	3	4	Total As of 1/29/2007
Amebiasis	6	3	3	5	17
Aseptic Meningitis (Viral)	107	119	223	134	583
Botulism	1	1	0	1	3
Brucellosis	0	4	1	1	6
Campylobacteriosis	83	139	106	106	434
Clostridium Difficile	7	7	2	0	16
Coccidioidomycosis	531	393	351	423	1698
Conjunctivitis	3	7	0	0	10
Creutzfeldt-Jakob Disease	1	1	0	0	2
Cryptococcosis	0	1	1	0	2
Cryptosporidiosis	1	6	8	4	19
Cytomegalovirus (CMV)	3	0	0	0	3
Dengue	0	1	1	8	10
Diarrhea, Nausea, Or Vomiting	1	15	0	2	18
E. Coli	12	11	17	9	49
E. Coli O157:H7	1	6	23	9	39
Encephalitis: Bacterial	0	0	1	1	2
Encephalitis: NOS	0	0	2	0	2
Encephalitis: Parasitic	0	0	1	0	1
Encephalitis: Viral	9	8	7	2	26
Giardiasis	6	10	29	23	68
H. Flu Invasive Disease	16	14	10	11	51
Hantavirus Infection	2	0	1	0	3
Hemolytic Uremic Syndrome (Hus)	0	0	1	2	3
Hepatitis A	49	15	16	22	102
Hepatitis B	320	302	305	270	1197
Hepatitis C	362	409	444	367	1582
Hepatitis D	0	1	0	0	1
Influenza	1106	355	11	38	1510
Kawasaki Syndrome	6	5	4	7	22
Legionellosis	2	6	9	6	23
Leptospirosis	1	0	0	0	1
Listeriosis	0	1	3	3	7
Lyme Disease	4	7	7	3	21
Malaria	3	4	8	2	17
Measles	0	0	2	0	2
Meningitis: Bacterial Other	6	5	4	6	21
Meningococcal Invasive Disease	4	0	1	1	6
Mumps	0	17	5	3	25
Non-Reportable Disease	69	70	82	14	235
Parvovirus B19 (Fifth Disease)	2	0	0	0	2
Pediculosis	0	0	1	0	1
Pertussis	100	58	71	65	294
Q Fever	0	1	1	2	4
Rabies Exposure	0	1	0	6	7
Rash	5	1	1	0	7

Diagnosis	1	2	3	4	Total As of 1/29/2007
Relapsing Fever	0	1	0	1	2
Respiratory Syncytial Virus (RSV)	1987	24	0	30	2041
Rocky Mountain Spotted Fever	1	2	1	1	5
Salmonellosis	74	94	149	112	429
Scabies	1	4	0	0	5
Shigellosis	38	61	183	129	411
Staphylococcal Infection	264	273	224	255	1016
Streptococcal Group A Infection	112	101	45	55	313
Streptococcal Group B Infection	26	37	28	13	104
Streptococcal Infection Other	3	1	0	1	5
Streptococcus Pneumoniae Infection	226	114	58	145	543
Taeniasis	1	0	1	1	3
Toxic Shock Syndrome	2	0	1	0	3
Tularemia	0	0	1	0	1
Typhoid Fever	1	4	1	1	7
Unexplained Death With Fever	0	0	0	1	1
VRE (Vanc Res Enterococcus)	485	437	371	395	1688
Varicella	326	334	115	159	934
Vibrio Infection	1	4	3	1	9
West Nile Virus	0	1	60	23	84
Yersiniosis	1	7	3	1	12
All	6378	3503	3006	2879	15766

Note: This table includes *confirmed and probable* cases listed by CDR date which is equivalent to the date of onset or next available date if onset date is unknown and may differ from ADHS data which is selected by date of report to the State.

MCDPH Division of Epidemiology/PHEM
Contact Numbers (all 602 area code)

Abrium Escarzaga	Senior Epidemiologist	372-2643
Alana Shacter	Epidemiologist	372-2636
Alisa Diggs	Senior Epidemiologist	372-2612
Amanda Lyon	Data Analyst, PHEM	372-2614
Bob England	Medical Director, MCDPH	506-6601
Cheryl Phillips	Administrative Assistant	372-2605
Derek Steinke	EPI Intern	372-2622
Fernando Kitcheyan	CDR/Infectious Diseases Data Analyst	372-2665
Gary West	Statistical Programmer	372-2603
Jeanette Gibbon	Senior Epidemiologist	372-2642
Jennifer Stewart	Epidemiologist	372-2621
Kristin Cass	Executive Assistant	372-2604
Liva Nohre	Senior Epidemiologist	372-2631
Mare Schumacher	Deputy Director, Epidemiology	372-2602
Natalie Fuller	Epidemiologist	372-2613
Philip Zuckerman	Surveillance Data Analyst	372-2606
Réchelle Harrion Moore	Communicable Disease Investigator	372-2618
Sarah Santana	Director, Epidemiology	372-2601
Tammy Sylvester	Surveillance Nurse Supervisor	372-2617
Tasha Stewart	Epidemiologist, PHEM	372-2632
Vjollca Berisha	Senior Epidemiologist	372-2611

To report communicable diseases, unusual health occurrences, and public health emergencies (all 602 area codes)

	Business Hours M-F 8a—5p	After 5p
Animal bite reports	506-7387	506-7387
Communicable diseases	506-6767	747-7111
Death certificates, (pager)	506-6805	450-9982
Funeral homes, human remains (pager)		229-9315
HIV (reports)	506-6426	Next business day
Public health emergencies	747-7111	747-7111
Rabies	747-7111	747-7111
STDs (other than HIV)	506-1687	Next business day
TB	506-5065 or 372-1408	747-7111
WNV Hotline	506-0700	506-0700

*For change of name or address or to be removed or added to this mailing list, please email Cheryl Phillips at: cherylphillips@mail.maricopa.gov or call (602) 372-2605

*For any questions or comments regarding this report, please send an email to epidemiology@mail.maricopa.gov